

SURGERY INSTRUMENTS

DR. KHALID MILAD

- CANNULA
- CATHETERS
- TUBES
- URO-INSTRUMENTS
- SPINAL NEEDLE
- EPIDURAL NEEDLE
- IV FLUIDS

VISIT...

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Cannula

A cannula (canula) is a tube that can be inserted for a giving fluid, obtaining blood samples and administration of medicine in a vein.

The best peripheral vein is antecubital vein.

Complication of venous cannula:

- Hematoma
- Phlebitis (mechanical or chemical irritation or from infection)
- Embolism (air, thrombus, fragments of catheter)
- Infiltration or extravasation of drugs and fluids to subcutaneous tissue.

Arterial canula:

- Commonly in radial artery, used during major surgeries and in critical care to measure beat to beat blood pressure and to draw repeated blood samples (ABG).



CENTRAL LINE VENOUS CATHETER

This is a double lumen catheter with insertion guide wire. The catheter length is 20 cm. There are two clamps for temporary control of each lumen and caps for sealing.

Uses:

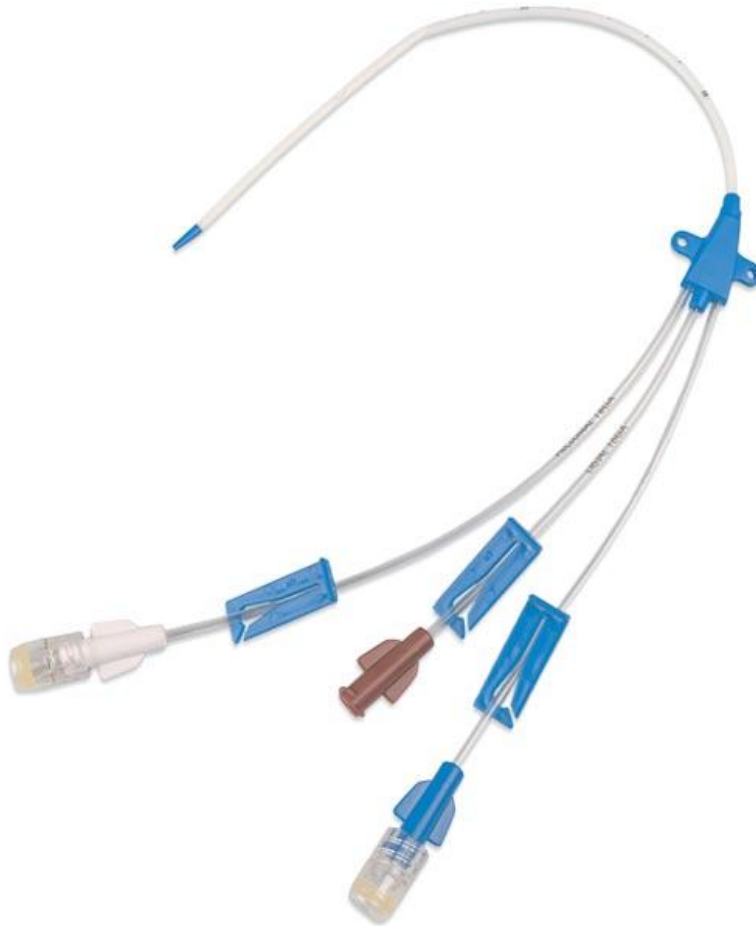
1. Medium or long-term venous access, for:
 - Measurement of the central venous pressure $\emptyset$ Parenteral feeding
 - Injection of chemotherapeutic agents.
2. Drugs that are prone to cause phlebitis in peripheral veins such as:
 - Calcium chloride. $\emptyset$ Chemotherapy.
 - Hypertonic saline.
 - Potassium chloride.
3. Plasmapheresis.

Technique of internal jugular catheterization:

- The skin is cleaned, and local anesthetic applied if required.
- A line is drawn between the mastoid process and the sternoclavicular joint.
- The carotid artery is palpated on this line and the internal jugular vein lies immediately lateral to it at the midpoint of this line. The head down position is used to prevent air being sucked in and to distend the vein.
- A 7cm needle, mounted on a syringe, is inserted caudally at 45 degrees to the vertical into the internal jugular vein.
- The syringe is removed and a seldinger wire is passed through the needle into the vein. The needle is removed and the catheter is placed over the wire and is passed into the vein.
- The wire is removed and the catheter sutured into position and covered with a sterile, transparent, self-adherent dressing.
- The catheter tip should be positioned in the superior vena cava or right atrium (confirmed radiologically).
- For jugular and subclavian lines, a chest X-ray is typically performed (to ensure that the line is positioned inside the superior vena cava and in the case of insertion through the subclavian vein, that there is no resultant pneumothorax).

Complications:

- brachial plexus and phrenic nerve injury and carotid artery perforation.
- Arrhythmias.
- haemothorax
- Hematomas.
- pneumothorax



CENTRAL VENOUS SET

CHEST TUBE

Description:

Plastic or rubber tubes of suitable size passed into the pleural cavity and connected to under-water seal closed system.

Complications:

- Injury to heart or aorta.
- Subcutaneous hematoma, seroma or emphysema.
- Injury to liver, spleen, or diaphragm.
- persistent pneumothorax or hemothorax.
- Hemorrhage, infection, re-expansion, pulmonary edema.

Indications:

- Drainage of the pleural cavity in cases of pneumo or hemothorax, hydrothorax, empyothorax, chylothorax.

Techniques

- The site of insertion is in the «triangle of safety», which is bounded by the anterior border of latissimus dorsi, the posterior border of pectoralis major and the superior border of the
- 5th rib (or the mid-axillary line, anterior axillary line and the 5th rib).
- 5th intercostal space slightly anterior to the midaxillary line open type is better and safer than closed insertion.
- Under local infiltration anesthesia incision is made in the skin and subcutaneous tissues sufficient to admit a finger easily. The intercostal muscles are separated by an artery forceps and the pleura is punctured and the intercostal drainage tube is inserted. A wide bore tube (>28 Fr) is used for the drainage of blood and fluids, whereas a smaller bore tube may be used for the removal of air.

Contraindication:

- Refractory coagulopathy.
- Diaphragmatic hernia.
- Pleural adhesion.
- Uncooperative patient.



CUFFED ENDOTRACHEAL TUBE

Description:

- Single cuffed tube, made of polyvinyl chloride (PVC)
- The cuff prevents leakage of the air and aspiration
- It also prevents acid aspiration syndrome (Mendelson's syndrome).

Indications:

- Depressed level of consciousness (e.g, in stroke, closed head injury, intoxication or poisoning (protective airway reflexes such as coughing and swallowing may be diminished or absent in such situation).
- In respiratory failure intubation should be considered if the arterial partial pressure of oxygen (PaO₂) is less than 60 (mm Hg) while breathing an inspired O₂. In patients with (PaCO₂) greater than 45 mm Hg.
- During Manipulation of the airway (Diagnostic or therapeutic manipulation of the airway (such as bronchoscopy, laser therapy or stenting of the bronchi) may intermittently interfere with the ability to breathe; intubation may be necessary in such situations.
- To give some drugs as:
 - Atropin – Lignocaine – Adrenaline – Diazepam – Isoprenaline – Naloxone

How to use?

- Place the patient in the extended head position. Use suction to clear the upper airway if needed.
- Hold the laryngoscope in the left hand, hold the mouth open with the right hand, and use the blade to push the tongue. Advance the blade carefully toward the midline until the epiglottis is visualized.
- Pass laryngoscope blade under the epiglottis and lift upward to visualize the vocal cords.
- While maintaining visualization of the cords, grasp the tube in your right hand and pass it through the cords.
- Ventilate the patient while auscultating and visualizing both sides of the chest to verify positioning. If the left side does not seem to be ventilating, it may signify that the tube has been advanced down the right main stem bronchus. Withdraw the tube 1-2 cm, and recheck the breath sounds. -Also auscultate over the stomach to ensure the tube is not placed in the esophagus.
- Confirm positioning with a chest x-ray. The tip of the endotracheal tube should be a few centimeters above the carina

Contraindications:

- Massive maxillofacial trauma (relative).
- Suspected cervical spinal cord injury (relative).
- Fractured larynx.

Indications:

- Head, neck, ENT, eye or thoracic surgeries.
- Use of muscle relaxant with prolonged surgery.
- Abnormal position in the table.
- Comatose patient, emergency surgery.
- Mechanical ventilation, CPR.
- Laryngeal edema or spasm.

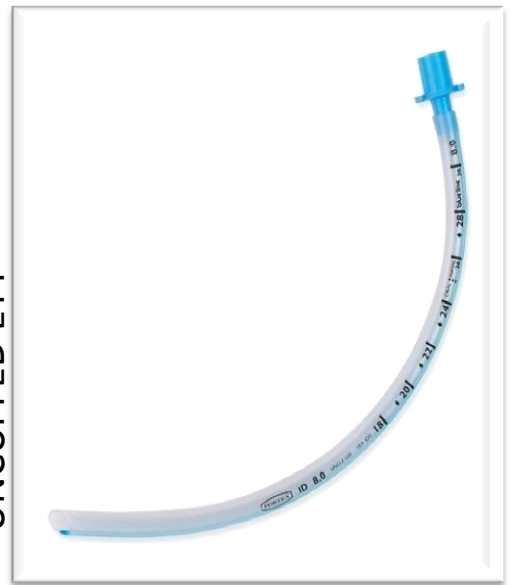
Complications:

- Introduction of infection.
- Tube kinking → respiratory obstruction.
- ETT may enter to right or left bronchus → lung collapse (so you must auscultate).
- Esophageal intubation → abdominal distention and hypoxia.
- Trauma to lips, gums, nasopharynx, or vocal cords.

CUFFED ETT



UNCUFFED ETT



FACE MASK

Facilitates delivery of anesthetic gas from a breathing circuit to a patient by creating an airtight seal with the patient's face. Also to deliver O₂ and drugs like ventoline into the patient.



IV FLUID TRANSFUSION SET

Description:

- Needle.
- Line.
- One reservoir.
- Rate control device

Uses:

- For transfusion of any fluid into the body, **except blood & blood components**



NASOGASTRIC TUBE

Description:

- 120 cm long tube, with different diameters
- Multiple openings at the tip
- It has a tunnel at the proximal end
- The tip is blunt & closed
- Its tip contains radioopaque substance
- It is made of rubber & transparent protex
- It is graduated

Marking:

- When the tip enters the stomach ➤ (40 cm)
- When the tip arches the antrum ➤ (50 cm)
- Entry into the pylorus ➤ (57 cm)
- Entry into the duodenum ➤ (65 cm)

Sterilization:

- Irradiation.
- Boiling.

Uses and indications:

- main use: ➤ feeding for minimal quantities of liquid.
- Decompression: ➤ Intestinal obstruction.
➤ Acute gastric dilatation (lifesaving).
➤ Acute pancreatitis.
➤ Perforated duodenal ulcer.
- Prior to major operations: ➤ It is not necessary unless it is clearly indicated.
- Remove gastric secretion and swallowed air.
- Feeding: ➤ Patients who cannot eat, but has a functioning bowel (coma and tetanus)
- Lavage: ➤ The Ewald tube is used for gastric lavage to remove clots in gastric bleeding.
➤ It is a large tube and is often introduced through the mouth because of its size.
- Diagnosis: ➤ Upper gastrointestinal bleeding.
➤ Acute gastric volvulus: Vomiting followed by retching, localized abdominal pain and failure to pass a nasogastric tube is a diagnostic triad for acute gastric volvulus.
➤ Pancreatic pseudocyst: A Ryle tube passed into the stomach may be palpable over the swelling in a thin patient.
➤ Esophageal atresia: If atresia is present, the tube will not enter the stomach and will curl up in the proximal pouch and perhaps appear in the mouth.

Treatment:

- Conservative treatment of esophageal perforation: This should be performed in the early stages after perforation and includes nasogastric drainage, massive antibiotic therapy, intravenous fluids, withdrawal of oral intake and total parenteral nutrition.
- Esophagocardiomyotomy.
- Administration of drugs and activated charcoal.

How to introduce?

- Lubricate the distal 4 inches of the tube with a water-soluble jelly.
- Insert the tube slowly through the nose and into the pharynx. If a gag reflex occurs, withdraw the tube about one inch and encourage the patient to relax. If obstruction is met with, simply rotate the tube, but never force it. If obstruction persists, try to pass the tube through the other nostril.
- Ask the patient to swallow several times and advance the tube steadily to its desired position.
- Severe gagging and retching indicates that the tube is curling up in the esophagus.
- Coughing or wheezing attacks during intubation usually indicate that the trachea has been entered by mistake.
- Secure the tube with a tape and avoid a tight curve, which can cause pressure necrosis of the nares.

How to confirm that it is in the GIT?

- It passes easily
- Absence of gagging and retching
- Absence of coughing, sneezing & cyanosis
- Free return of gastric contents
- Aspiration of gastric contents
- Injection of 10 ml air while listening with the stethoscope placed on the epigastrium to hear a characteristic gurgle.
- Measuring must be done before insertion of NGT from tip of nose of the patient to his ear and down to xiphoid process.

Care of tube:

- Irrigation with 30 ml of normal saline (or 20 ml of air) every 2 hours.
- Check of intake and output, which is important for electrolyte replacement.
- Good oral hygiene that is essential to avoid inflammation of the parotid gland. This can be achieved by frequent mouth washes and sucking ice chips.
- Mild nasal decongestant can be helpful in preventing otitis.
- Irritation of the Eustachian tubes in the nasopharynx may lead to their obstruction.

Contraindications:

- Patient with fracture base of skull
- After gastric bypass surgery
- Facial fracture
- Obstructed esophagus and airway.

Complications:

- Wrong insertion into the trachea.
- Esophageal perforation, aspiration.
- pulmonary aspiration/collapsed lung.
- Erosions, ulceration and bleeding in prolonged intubation especially along the lesser curvature.
- Reflux esophagitis.
- Curling up in the pharynx during insertion.
- Pressure necrosis of the nares if the tube is tightly curved.
- Intracranial placement of tube.

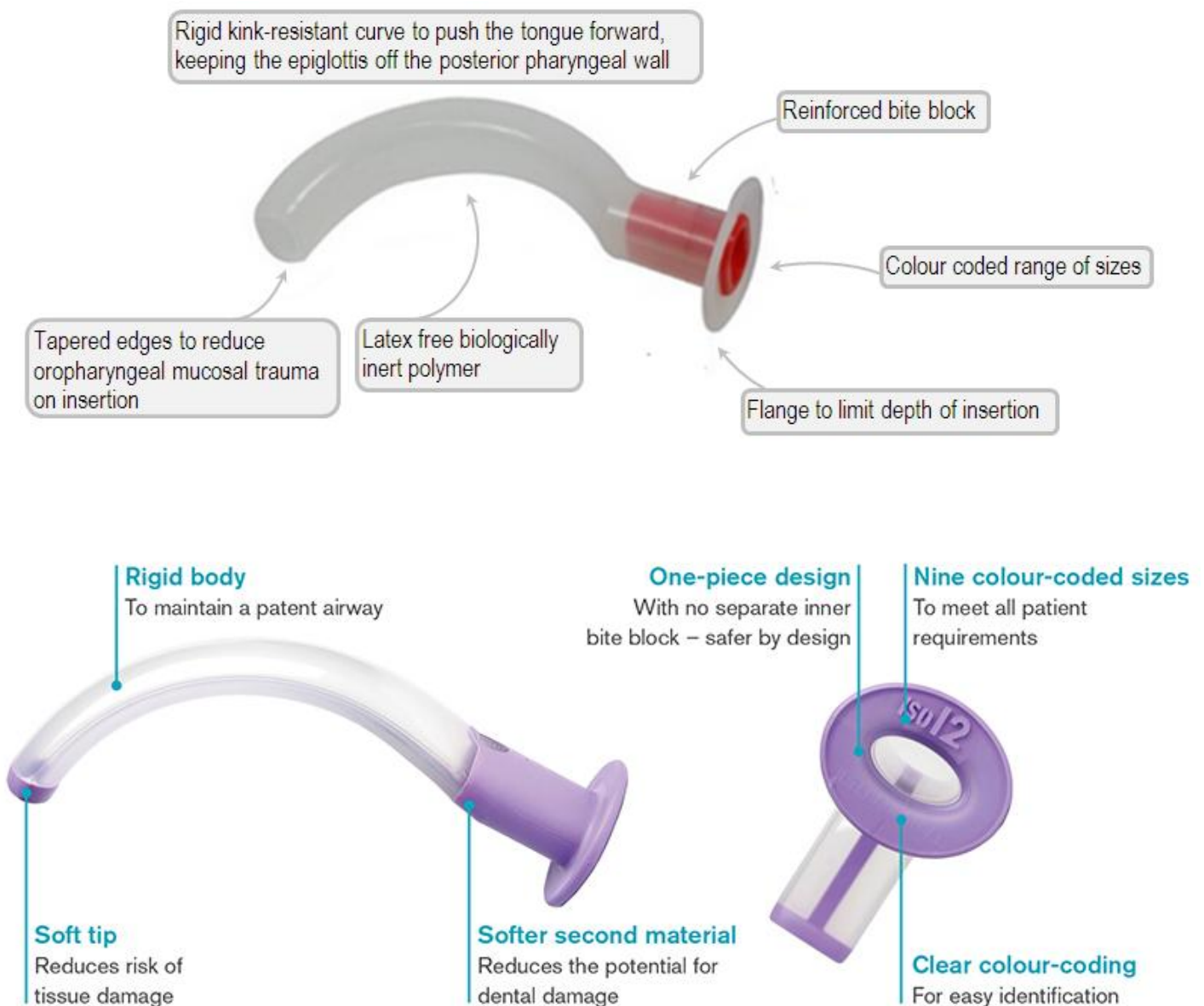


OROPHARYNGEAL TUBE

This is a curved rigid tube which, when inserted, follows the curvature of the tongue pulling the tongue and the epiglottis away from the posterior pharyngeal wall and providing a channel for air passage.

Uses:

To prevent the tongue and epiglottis from falling back against the posterior pharyngeal wall in anaesthetized patients.



SENGSTAKEN TUBE

It is an oro/naso gastric tube used in management of GIT hemorrhage in esophageal varices.

Description:

- 2 additional side tubes applied to the 1 main central tube
- It has 2 inflatable balloons: a gastric balloon; 1 spherical when inflated & an esophageal balloon; tubular when inflated. Made of red rubber & modern tubes are made of silicon

Sizes:

- Length: 115 cm
- Outer diameter: 2 sizes; 5.3 mm & 6.6 mm
- Balloons: the size of the balloon is written on it in cm (ml)

Insertion:

- Examine the tube by inflation outside the GIT.
- Sedation with valium
- Spray the pharynx with xylocaine
- Lubricate the tube.
- Introduce through the nose into the stomach (50 cm)
- Aspirate the contents. Inflate the gastric balloon with 250 ml air
- Pull the tube against the cardia & fix it to the cheek.
- The esophageal balloon is inflated to a pressure of 30 - 40 mm hg (40 - 60 ml air) to occlude the varices.
- The tube should be deflated after 24 hours & left in situ for another 24 hours.
- If bleeding recurs the tube is reinflated & the patient is prepared for urgent injection sclerotherapy or emergency operation.

Uses:

- To stop bleeding esophageal varices
- The spherical gastric balloon is more important than the tubular esophageal balloon because it is plugged into the gastroesophageal junction, which is the commonest site for varices which are more liable for bleeding. Also it is considered as a part of portosystemic disconnection.

Complications:

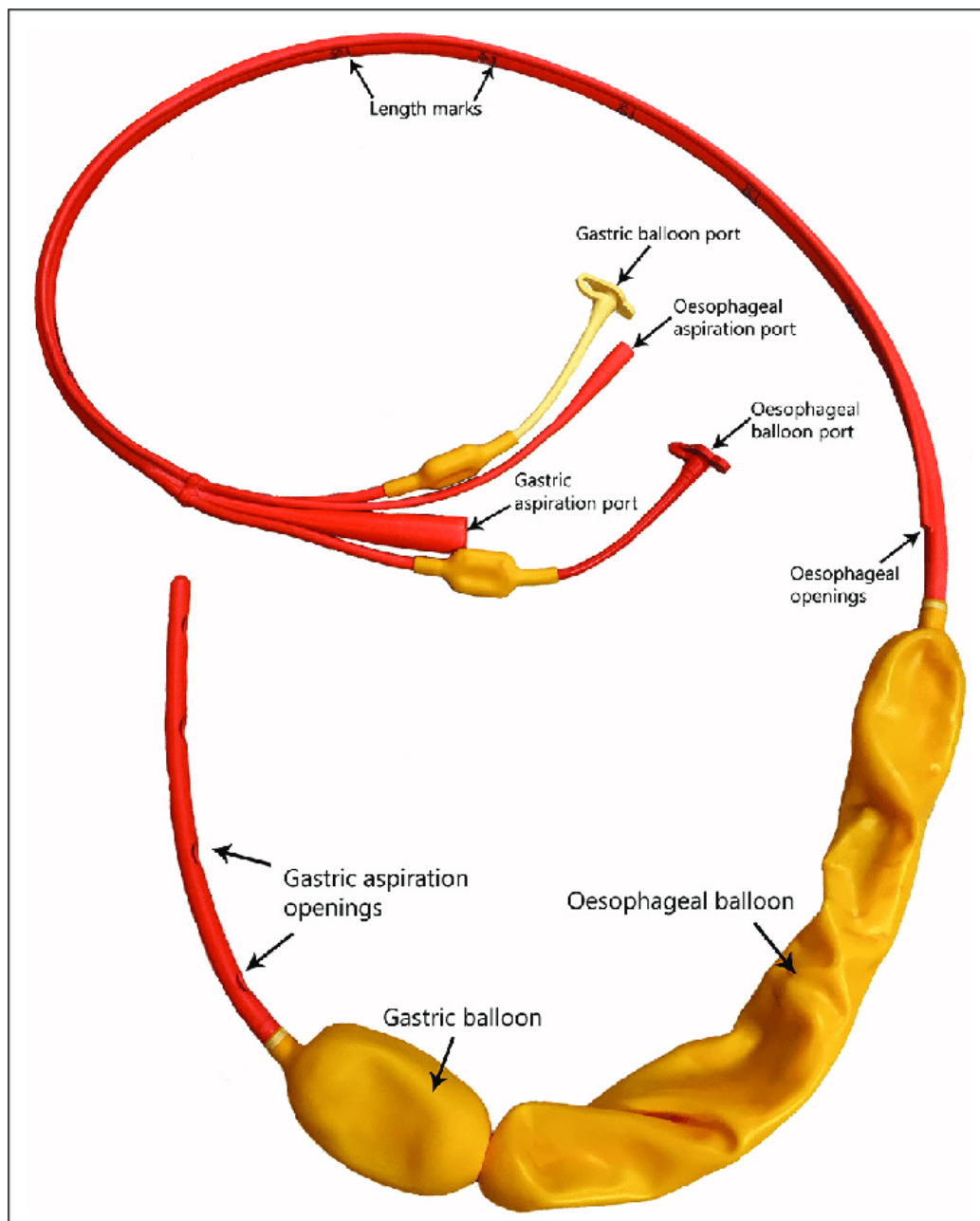
- 1) Difficult or false introduction leads to cyanosis & cough.
- 2) Pressure necrosis in the ala of the nose.
- 3) Discomfort of the patient.
- 4) Laryngeal obstruction if the gastric balloon ruptures allowing the esophagus compressing the larynx.

- 5) Pressure necrosis in the esophagus → perforation → mediastinitis.
- 6) Not as effective as injection sclerotherapy.
- 7) Respiratory infections (aspiration pneumonia).

Modified sengstaken-blakemoore tube

As sengstaken tube, but with 4 tubes, the 4th is used for suction of esophageal secretions

Uses, insertion & complications: As sengstaken-blakemoore tube.



T-TUBE

Description:

- Long t-shaped rubber tube
- Long vertical limb
- Made of latex material, never from plastic, which may be hardened by bile → difficult removal of the tube Yellowish in color
- Short horizontal limb
- Yellowish in color.

Size:

- Measured in French scale like urinary catheters.

Uses:

- After surgery of the common bile duct.
- After ureteric surgery with extraction of uretric stone

Advantages:

- It allows passage of bile, if a narrowing exists in CBD
- It prevents leakage of bile It prevents stasis of bile
- Cholangiography by urograffin can be done postoperatively to check its position & to be sure that there is no urographin is left in the duct.

When to remove T-tube?

- 10-14 days postoperatively
- If there is abdominal pain, jaundice, or pale coloured faeces do not remove it until the patient improves
- If there is no such symptoms clamp the tube and remove it by steady pulling

How to use?

- The short limb is placed in the CBD
- The long limb comes out through the wound
- Preparation & insertion:
- There is no need for the short limbs of the T-tube to be longer than 1.5 cm.
- Drainage is improved by removing a gutter from the length of the short limbs, involving one third to half of the circumference of the tube.
- Cutting out A V opposite the long limb facilitates removal of the tube.
- The short horizontal limb is placed vertically within the common bile duct.
- The long limb is brought to the exterior from the most dependent part of the CBD and connected to a sterile container.

Management in the bile duct:

- Bile usually drains freely in the early postoperative days because of edema in the distal end of the bile duct and spasm of the sphincter, the result of the passage of instruments during operation. This temporary obstruction normally subsides during the first week.
- A postoperative cholangiogram is performed between the 8th and the 10th day.
- If the cholangiogram is normal (no filling defects in the bile ducts and free passage of contrast into the duodenum) and if the patient is not jaundiced, the tube may be clamped with a screw clamp for 24 hrs. • If no pain occurs, the tube can be removed.

Removal:

- The tube may be removed by a steady pull.
- If it cannot be extracted by moderate tension, a haemostat may be applied to the tube, close to the skin, and the patient allowed walking about.
- This often allows the tube to come away.
- After removal of the T-tube there may be a small amount of biliary discharge for the first 24 of 36 hr.

Contraindications to removal:

- Jaundice and fever.
- Pain after clamping.
- Leakage of bile after clamping.
- Abnormal T-tube cholangiogram.

Complications:

Occlusion:

- The T-tube may become blocked by blood clot or by biliary mud in the early postoperative period or by encrustation when the tube has been retained for a longer period. Gentle syringe irrigation will usually restore patency.

Dislodgement:

- The tube may be pulled out completely or the T-end can be pulled out of the bile duct into the peritoneal cavity with cessation of bile drainage from the tube. Biliary peri-tonitis may develop or the dressing becomes saturated by copious escape of bile.

Treatment of dislodged T-tube:

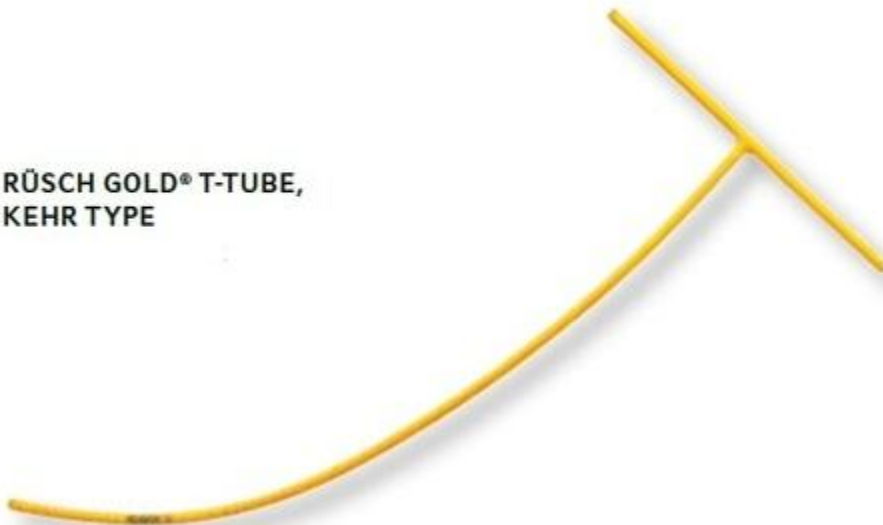
- If the tube is dislodged before the 4th day, the abdomen must be reopened, the bile sucked out of the peritoneal cavity and a new T- tube inserted.

If Dislodgment occurs on or after the 4th day:

- If there is evidence of bile peritonitis (fever, tachycardia and abdominal pain), reoperation is performed.
- If there is no evidence of bile peritonitis, the patient is carefully observed. The drain and the dislodged tube should be left in situ until drainage subsides.



RÜSCH GOLD® T-TUBE,
KEHR TYPE



ORDINARY URINARY CATHETER

Other name: Jacque's & Harris catheter

Description:

- 30 cm long rubber or plastic colorless catheter.
- The hollow tip permits the use of metal introducer.
- It is more stiff than Folley's catheter.
- Solid tip.
- One side lateral eye.
- Non-self-retaining.

Types:

- Plastic
- Red rubber

Sizes:

- According to French or English scales.

Sterilization:

- Boiling.
- Irradiation

Uses:

-
- **Diagnostic:**
 - Retention of urine
 - Rupture of the urinary bladder
 - Assessment of the residual volume of urine after voiding,
 - Urodynamic evaluation of the urinary bladder & urethral function
 - To obtain urine for microscopic study in female when voided urine is markedly vaginally contaminated
 - **Therapeutic:**
 - Relief of retention of urine
 - Postoperative after urethral or bladder operation
-

How to use?

- See pages 92 & 93

Contraindications:

- Rupture of the urethra

Complications:

- 1) Trauma
- 2) False passage
- 3) Prolonged use leads to urethritis because it contains several irritating antioxidants

Endotracheal Tube (ETT)

Indication for endotracheal intubation

- For supporting ventilation in patient with some pathologic disease, CPR.
- For supporting ventilation during general anesthesia, and use of muscle relaxant
- Upper airway obstruction
- Respiratory failure
- Depressed level of consciousness (defined as a score on the Glasgow Coma Scale of less than 8)

Types:-

1. Cuffed tube:-
 - To prevent aspiration of gastric contents, blood, secretions and other fluids into trachea.
 - To prevent gas leak outside.
2. Non-cuffed:-
 - In children <10 yr avoid pressure necrosis of the upper airways.

Complication of endotracheal intubation:

- | | |
|-------------------------|--|
| 1) During intubation | <ul style="list-style-type: none">➤ Trauma to lip, tongue, vocal cords. Or teeth.➤ Hypertension and tachycardia or arrhythmia.➤ Pulmonary aspiration.➤ Introduction of infection.➤ Laryngospasm and bronchospasm➤ Laryngeal edema.➤ Arytenoid dislocation → hoarseness Increased intracranial pressure.➤ Spinal cord trauma in cervical spine injury➤ Esophageal intubation. |
| 2) During remained int. | <ul style="list-style-type: none">➤ Obstruction from kinking → resp. obstruction.➤ ETT may enter to RT or LT branches → lung collapse.➤ secretion or overinflation of cuff Accidental extubation➤ endobronchial intubation.➤ Disconnection from breathing circuit.➤ Pulmonary aspiration.➤ Lip or nasal ulcer in case with prolong period of intubation.➤ Sinusitis or otitis in case of prolong nasoendotracheal intubation. |
| 3) During extubation | <ul style="list-style-type: none">➤ Laryngospasm➤ Pulmonary aspiration |

-
- 4) After extubation
- Edema of upper airway
 - Sore throat
 - Hoarseness
 - Tracheal stenosis (Prolong intubation)
 - Laryngeal granuloma
-



Spinal needle

- A lumbar puncture, or spinal tap, is a procedure to collect cerebrospinal fluid to check for the presence of disease or injury.
- The spinal needle is inserted, usually between the 3rd and 4th lumbar vertebrae in the lower spine.
- Once the needle is properly positioned in the subarachnoid space (the space between the spinal cord and its covering, the meninges), pressures can be measured and fluid can be collected for testing.
- Spinal anaesthesia, also called spinal analgesia or sub-arachnoid block (SAB), is a form of regional anaesthesia involving injection of a local anaesthetic into the Subarachnoid space, generally through a fine needle, usually 9 cm long (3.5 inches).

Indications:

- This technique is very useful in patients having an irritable airway (bronchial asthma or allergic bronchitis), anatomical abnormalities which make endotracheal intubation very difficult (micrognathia), borderline hypertensives where administration of general anaesthesia or endotracheal intubation can further elevate the blood pressure, procedures in geriatric patients. It is the technique of choice for diabetic patients.

Contraindications:

- Non-availability of patient's consent.
- Local infection or sepsis at the site of lumbar puncture.
- Bleeding disorders, space occupying lesions of the brain,
- Disorders of the spine and maternal hypotension.

Operations

All surgical interventions below the umbilicus, is the general guiding principle:

- Abdominal & vaginal hysterectomies.
- Laparoscopy Assisted Vaginal Hysterectomies (LAVH) combined with general anaesthesia.
- Caesarean sections.
- Hernia (inguinal or epigastric).
- Piles, fistulae & fissures.
- Orthopaedic surgeries on the pelvis, femur, tibia and the ankle.
- Nephrectomy.
- Cholecystectomies.
- Trauma surgery on the lower limbs, especially if the patient is full-stomach.
- Open tubectomies.
- Transurethral resection of the prostate.

Complication of spinal anaesth. :-

I. Immediate complication:-

1. Hypotension.
2. Toxicity.
3. Anaphylactic shock.

II. Late complication:-

1. Headache. (PDPH): post dural puncture headache
2. Urinary retention.
3. Introduction of infection → meningitis.
4. Backache, hematoma.
5. Nerve paralysis.

III. Others:-

1. Nausea & vomiting.
2. Sensitivity to drugs.
3. Failure of spinal anasth.
4. Sudden death.
5. Vasovagal attach.
6. Spinal shock, Cauda equina injury, Cardiac arrest, hypothermia, broken needle.

EPIDURAL ANESTHESIA:-

- Injection of anesthesia in epidural space which is bounded by:
 - Ant: dura mater.
 - Sup: foramen magnum.
 - Post: lig. Flavum.
 - Inf: S₂ vertebra.
- Level of inj: at any level of vertebral column.
- Epidural needle is thicker than spinal needle & kinked upward if t need for introducing epidural catheter.
- Technique:- after loss of resistance (piercing lig. Flavum) inject drug.
- Used e.g for painless labour, for C/s if needed (just ↑ dose), for intraop. & postop. Pain relieve.
- Complication, indication, ... etc → see spinal anesthesia.
- Saddle block: is spinal anesthesia defined to sacral region (ie sacral dermatoms only).



SPINAL NEEDLE

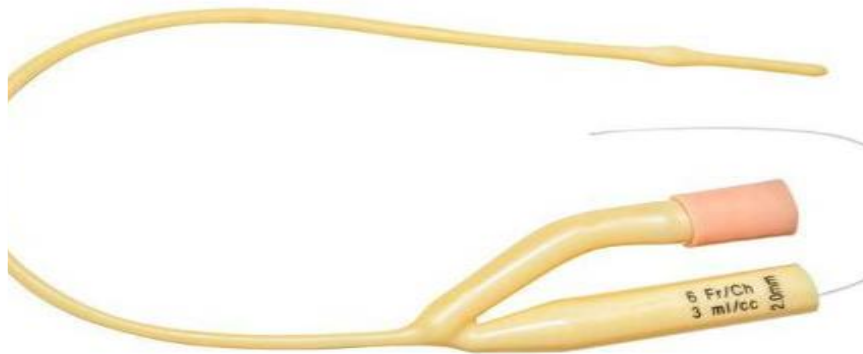


EPIDURAL NEEDLE

types of urinary catheters:

- 1) Urethral catheter.
- 2) Suprapubic catheter.
- 3) Ureteric catheter.
- 4) Double J catheter (DJ)(JJ).
- 5) Nephrostomy tube catheter.
- 6) Condom.

self retaining two way urethral catheter



SUPRAPUBIC CATHETER

Urethral catheter FOLLY'S CATHETER

Description:

- Self-retaining urethral catheter
- Balloon below the tip, inflated with water, the size of the balloon is written in ml at the end
- There is a type provided with large balloon, that is used after prostatectomy. It has a hemostatic effect a
- There is a variant provided with extra channel to allow bladder irrigation (triple way catheti
- It has two tubes: urethral tube & balloon tube; with a valve at the outer end

Sizes:

- There are two numbers written on the catheter:
- The other shows the capacity of the balloon (10-30 ml-cc)
- One shows the diameter from 2-26 F (French scale) (1 french = 1/3 mm)

(the French scale is a measure of the external diameter of the catheter) . For safety, nothing more than 14 Ch is needed to drain urine.

Types:

- I. Non-self retaining (Non-Ballon).
- II. Self retaining (Ballon).
 - 2 way urethral catheter
 - Latex (change it every 1 wk).
 - Silicon (change it every 1 month)
 - 3 way urethral catheter
 - Latex
 - Silicon.
 - Hematuria catheter

Notes:

- The 2 ways catheter one way for drainage of urine, the other for inflation and deflation of ballon (contains a valve) inflation by normal saline
- The 3 ways catheter as 2 way with 3rd way for irrigation of bladder or installation of treatment.
- Hematuria catheter → is silcon, straight, lax catheter reinforced with nylon coil to resist collapse during blood suction under vacum and because of weak wall of Urinary bladder due to wash and suction pressure → damages UB wall.
- The normal caliber of catheter written on it (20 french) and if divided by 3 → the external diameter in mm.

- The capacity of catheter is written in ml. and balloon filled with sterile saline (not air) as air obstructs urine outflow.

Precautions:

- Before you inflate the balloon, make sure that the catheter is in the urinary bladder, not in the urethra
- Smaller balloons should be used for routine drainage because there is less residual urine & less infection (Small is beautiful)
- Silicon catheters are preferred for prolonged use because it has wider lumen & made of very inert material that does not bubble after prolonged use, in contrast to silastic tubes
- Use the safest, smallest silicon catheter that does the job
- Use closed drainage system

Indications:

- 1) acute urine retention (common).
- 2) To empty bladder pre- & post operative (C/S, BPH)
- 3) coma, ICU, neurogenic UB. (input/output).
- 4) Installation of chemotherapy and antiseptics.
- 5) Input/output monitoring.
- 6) Neurogenic bladder → SIC (self intermittent catheterization).
- 7) Comatose patient and ICU (normal urine output 30 - 60 ml/hr)(0.5 - 1ml /kg/hr).
- 8) Treatment of urinary outlet obstruction, urinary incontinence.
- 9) Post (following) urinary surgery.

Complications

Urinary sepsis and Urethral stricture

long term complications may include:

- | | | |
|---|-----------------------------|-------------------|
| • urinary tract infections | • blood infections (sepsis) | • urethral injury |
| • skin breakdown | • bladder stones | • hematuria |
| • bladder cancer may develop (After many years of catheter use) | | |

- | | |
|------------------------------|--|
| • During insertion: | ➤ Bleeding → Change to suprapubic. |
| | ➤ Rigor, infection |
| • While catheter in urethra: | ➤ Stone formation → egg-shaped appearance (Ca ⁺⁺ on balloon due to long time + infection) |
| • when remove canula: | ➤ Trauma to urethra. |

-
- Others:
 - Trauma to urinary bladder.
 - UTI
 - Septicemia
 - bladder stone
 - stricture urethra
-

Contraindications:

- Bleeding per urethra → do suprapubic.
- Trauma or urethral injury.
-

Catheterization in males:

1. Lubricate the urethra with a 0.25% chlorhexidine gel containing 1 % lignocaine.
2. Complete aseptic precautions should be taken, so that the catheter never touches the patient's skin or that of the surgeon's hands.
3. "Never use any force at all" is the first and last rule in passing a catheter.
4. The penis is gently pulled up to make the urethra straight (at rest, it is folded like a sock).
5. The catheter is advanced until its tip reaches the external sphincter where the patient experiences a discomfort unless the urethra is well anaesthetized.
6. Once passed the external sphincter, the catheter will find its way into the bladder so long as it is flexible and well lubricated.
7. If it is a self-retaining catheter, the balloon is inflated with saline according to the capacity written on the catheter.

The correct position of the catheter is known by:

- Easy introduction with no bleeding
- The urine comes out
- Sudden loss of resistance

Catheterization in females:

- Follow the rules mentioned above (1,2 & 3)
- The labia are spread with the index & thumb of one hand to expose the urethral orifice
- The catheter is introduced and advanced until urine comes out.

supra pubic catheter:

- cystotomy done via open by surgery, or closed by percutaneous.
- UB should be full of urine for easy recognition and insertion.

Indications:

- Failed urethral catheter.
- longterm catheterization.
- Contraindicated urethral catheter
- urethritis, prostatitis, bleeding or trauma of urethra.

Contraindications:

- cancer urinary bladder.
- infected area (sever).
- bleeding disorders.
- lower abdomen scar.

Insertion:

- Complete aseptic technique (shaving of hair, alcohol cleaning).
- Local anesthesia (midline, 2 finger suprapubic). (skin, subcutaneous, aponeurosis, rectus muscle separation).
- Insert catheter → inward downward backward. Note: Suprapubic catheter is a silicon.

Ureteric catheter:

- Indicated only diagnostic at cystoscope, “retrograde cystoscope” (Dx upper tract).
- 16 cm → every mark 5cm.
- It is “radio-opaque”.

Double J catheter:

- It is a 30-35cm long tube, also called ureteric stent with coiled 2 ends.

Indications:

- 1) to pass obstruction as:

➤ Intramural	✓ cancer, stricture
➤ Intraluminal	✓ stone ...etc.
➤ Extra-luminal	✓ Pelvic tumor ...etc.
- 2) Prophylaxis in case of ESWL (extracorp. shock-wave lithotherapy). to prevent stone stricture
- 3) Ureteric injury or tumour (to ensure urine drainage).

Insertion

- Complete aseptic technique, under guide of cystoscope.

Complications

- Displacement
- Infections. hematuria, retention (block).

- ↑ frequency of urine and urgency.

NEPHROSTOMY TUBE:-

Indication:-

1. Diagnostic (antegrade urography), measure renal pelvis pressure.
2. Therapeutic (commonest) in pyonephrosis & obst.

URINE CONDOM:-

- External use in male who:
 - Unable to walk.
 - Has urine retention.

URINE BAG:-

- Collect urine & obtain output of urine



URINE CONDOM



URINE BAG

Double J catheter



IV fluids

Total body fluid 60% divided into :

- I. Intracellular:
- II. Extracellular:
 - Intravascular
 - Interstitial

Dialy requirement of $\text{Na}^+ = 1 - 1.5 \text{ meq/kg}$

$\text{K}^+ = 0.3 - 70 \text{ meq/day}$.

Caloric = 35 cal/kg at rest.

- IV fluids:**
- Crystalloids:
 - Dextrose saline 5%, normal saline.
 - Dextrose saline, ringer lactate.
 - Na bicarbonate.
 - Colloids:
 - Plasma ptn
 - Human albumin
 - Gelfusin
 - Dextran
 - Hydroxyl ethyl starch.

Crystalloids

1. **Dextrose:-** (5%) (10% - 20%) (50%)
C/I in head injury (enhance cerebral damage)
 - 5% dextrose: isotonic to plasma, has same particles as in plasma, same osmolarity as blood.
 - 10% - 20% dextrose: in total parenteral nutrition used.
 - 50% dextrose: in diabetic coma (1L contain 50g glucose = 200 calories).
2. **Dextrose saline:**
 - 4.3% dextrose, 0.18% NaCl, (called 1/5 solution).
 - Postoperatively ($\uparrow$ aldosterone, $\uparrow$ ADH) $\rightarrow \uparrow \text{Na}^+$ so don't load body with dextrose saline.
3. **Normal saline:-** (C/I in H.F)
 - NaCl 0.9% (1 ml $\rightarrow$ 0.9g of NaCl), isotonic.
 - 1 litre $\rightarrow$ dialy requirement of Na^+ (about 100)
4. **Ringer's lactate (Hartman's solution):**
 - It is cardioplegic (used in cardiac surgery) as high titer of potassium $\rightarrow$ cardiac arrest.
 - Contain: Na^+ , K^+ , Cl^- , Mg^{++} , lactate (lactate act as HCO_3 inside body).
5. **Sodium bicarbonate:**
 - NaHCO_3 8.4, every 1 ml = 1mmol of bicarbonate.

- Potassium chloride (in hypokalemic)

Colloids: (plasma expander)

- Large molecular weight, remain in intravascular compartment.

1. **Plasma proteins:-**

- Expansive, work by increase osmotic pressure, so withdraw fluid from tissue → increase intravascular volume.
- Not used in dehydrated pt (rehydrate him 1st).
- Used in shocked pt.

2. **Human albumin:** (5%) (10%)

- Mainly used in: Heart failure, Nephrotic syndrome.

3. **Gelfusin:** (Hemeral)

- Very good colloid solution.
- Very cheap & effective & long half life.
- S/E: hypersensitivity.

4. **Dextran:** (starch)

- Polysaccharide, dextran 70% only used now, other forms --- neural damage.
- Interfere with blood grouping (take blood group & cross match before giving) because of similarity between dextran & ABO.
- It presents thrombosis used in orthopedic & gynecology esp. in lower limb.
- S/E: hypersensitivity
- Adv.: cheap.

5. **Hydroxyl ethyl starch:** (Hes)

- Cheap & effective.



1000 mL

NDC 0409-7926-09

5% DEXTROSE and 0.45% SODIUM CHLORIDE Injection, USP

EACH 100 mL CONTAINS DEXTROSE, HYDROUS 5 g; SODIUM CHLORIDE 450 mg IN WATER FOR INJECTION. ELECTROLYTES PER 1000 mL: SODIUM 77 mEq; CHLORIDE 77 mEq. 406 mOsm/LITER (CALC).

pH 4.3 (3.5 to 6.5). ADDITIVES MAY BE INCOMPATIBLE. CONSULT WITH PHARMACIST, IF AVAILABLE. WHEN INTRODUCING ADDITIVES, USE ASEPTIC TECHNIQUE, MIX THOROUGHLY AND DO NOT STORE. SINGLE-DOSE CONTAINER. FOR I.V. USE. USUAL DOSAGE: SEE INSERT. STERILE, NONPYROGENIC. USE ONLY IF SOLUTION IS CLEAR AND CONTAINER IS UNDEMANAGED. MUST NOT BE USED IN SERIES CONNECTIONS.

Rx ONLY



CONTAINS DEHP



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